UNIT #3 TEST Chemistry 111
Ch 10, 11.1,11.2, 12.1

Key Concepts

10.1 The Mole: A Measurement of Matter

- Three methods for measuring the amount of a substance are by count, by mass, and by volume.
- A mole of any substance always contains Avogadro's number of representative particles, or 6.02×10^{23} representative particles.
- The atomic mass of an element expressed in grams is the mass of a mole of the element.
- To calculate the molar mass of a compound, find the number of grams of each element contained in one mole of the compound. Then add the masses of the elements in the compound.

10.2 Mole–Mass Relationships

- The molar mass of an element or compound is the conversion factor for converting between the mass and the number of moles of a substance.

10.3 Percent Composition and Chemical Formulas

- To determine the percent by mass of any element in a given compound, divide the element's mass by the mass of the compound and multiply by 100%.
- An empirical formula of a compound is the simplest whole-number ratio of atoms of the elements in the compound.
- The molecular formula of a compound is either the same as its experimentally determined empirical formula, or it is a simple whole-number multiple of it.

Avogadro's number | Empirical formula | Molar volume | Molar mass
Mole (mol) | Percent composition | Representative particle

- [redacted]
- Avogadro's number (p. 290)
- empirical formula (p. 309)
- molar mass (p. 294)
- [redacted]
- mole (mol) (p. 290)
- percent composition (p. 305)
- representative particle (p. 290)
- standard temperature and pressure (STP) (p. 300)

11.1 Describing Chemical Reactions

- To write a word equation, write the names of the reactants to the left of the arrow separated by plus signs; write the names of the products to the right of the arrow, also separated by plus signs.
- To write a skeleton equation, write the formulas for the reactants to the left of the yields sign and the formulas for the products to the right.
- After writing the skeleton equation, use coefficients to balance the equation so that it obeys the law of conservation of mass.

11.2 Types of Chemical Reactions

- The five general types of reactions are combination, decomposition, single-replacement, double-replacement, and combustion.
- The number of elements and/or compounds reacting is a good indicator of possible reaction type and thus possible products.

- In a combination reaction, there is always a single product.
- A decomposition reaction involves the breakdown of a single compound into two or more simpler substances.
- In a single-replacement reaction, both the reactants and the products are an element and a compound.
- A double-replacement reaction generally takes place between two ionic compounds in aqueous solution.
- A combustion reaction always involves oxygen as a reactant.

11.3 Reactions in Aqueous Solution

- You can predict the formation of a precipitate by using the general rules for solubility of ionic compounds.

12.1 The Arithmetic of Equations

- A balanced chemical equation provides the same kind of quantitative information that a recipe does.
- Chemists use balanced chemical equations as a basis to calculate how much reactant is needed or product is formed in a reaction.
- A balanced chemical equation can be interpreted in terms of different quantities, including numbers of atoms, molecules, or moles; mass; and volume.
- ⇨ Mass and atoms are conserved in every chemical reaction.

- decomposition reaction (p. 332)
- double-replacement reaction (p. 334)
- combustion reaction (p. 336)
- balanced equation (p. 325)
- catalyst (p. 323)
- chemical equation (p. 323)
- coefficients (p. 325)
- combination reaction (p. 330)
- single-replacement reaction (p. 333)
- skeleton equation (p. 323)

Other topics: **Sealed Flask Calculations and predicting products for all 5 types of reactions** ⇧

Formulas $n = \frac{m}{M}$ $n = \frac{\#particles}{avogadros\ number}$

AND $\frac{m}{M} = \frac{\#particles}{avogadros\ number}$